

What Is Claimed Is:

1. A method for determining the exhaust-gas recirculation quantity for a combustion engine having exhaust-gas recirculation, characterized by the following steps:

- Advance determination of a basic quantity ( $m_{\text{basic}}$ ) of a gas mixture inducted into the engine combustion chamber(s), as well as a basic pressure and/or a basic temperature of the gas mixture for at least one predefinable basic state of the combustion engine at deactivated exhaust-gas recirculation;
- Ascertainment of pressure and/or temperature of the inducted gas mixture for a particular current engine state at activated exhaust-gas recirculation, and determination of the currently inducted gas-mixture quantity ( $M_{\text{Engine}}$ ) as the basic quantity, corrected at least by the ratio of currently ascertained pressure to basic pressure of the gas mixture and/or the ratio of basic temperature to currently ascertained temperature of the gas mixture; and
- Determination of a fresh-gas portion ( $m_{\text{Air}}$ ) of the inducted gas mixture for the particular current engine state, and determination of the current exhaust-gas recirculation quantity on the basis of the difference between the ascertained currently inducted gas-mixture quantity and the ascertained current fresh-gas portion.

2. The method as recited in Claim 1, wherein the predetermined basic data are updated with the engine running when suitable, predefinable engine-operating states are present, on the basis of ascertained current quantity, pressure and temperature values of the inducted gas mixture.

3. The method as recited in Claim 1 or 2, wherein the ascertainment of the current temperature of the inducted gas mixture includes the determination of a mixing

temperature ( $T_{mix}$ ), which results from the admixing of recirculated exhaust gas to the fresh-gas portion of the inducted gas mixture.

4. The method as recited in Claim 3, wherein the ascertainment of the mixture temperature is implemented by a temperature sensor (9), which has a sufficiently fast response characteristic and is placed downstream from an admixing location of recirculated exhaust gas to the fresh-gas portion, or by a mixture-temperature model (10), which includes a model-based determination of the exhaust-gas temperature on the basis of basic exhaust-gas temperature values, ascertained in advance for a basic state, and of temperature-correction contributions ( $dT1$ ,  $dT2$ ,  $dT3$ ,  $dT4$ ), which are obtained from a current detection of influence parameters relevant for the exhaust-gas temperature.

5. The method as recited in Claim 4, wherein, to determine the temperature of the recirculated exhaust gas, the exhaust-gas temperature value, determined via the exhaust-gas temperature model, is additionally corrected by an exhaust-gas recirculation cooling-rate contribution.

6. The method as recited in one of Claims 3 through 5, wherein the mixture-temperature model is updated while the engine is running during sufficiently steady-state engine operating states on the basis of the measured values from a temperature sensor, which is situated downstream from the admixing location of recirculated exhaust gas to the fresh-gas portion.

## Summary

1. A method for determining the exhaust-gas recirculation quantity.

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2.1. The present invention relates to a method for determining the exhaust-gas recirculation quantity for an internal combustion engine having exhaust-gas recirculation.

10 2.2. According to the present invention, a basic quantity of a gas mixture inducted into the engine combustion chamber(s) is determined in advance, as well as a basic pressure and/or a basic temperature of the gas mixture for at least one predefinable basic state of the combustion engine at  
15 deactivated exhaust-gas recirculation is ascertained. With the engine running, pressure and/or temperature of the inducted gas mixture are/is then determined for the current engine state at activated exhaust-gas recirculation. The currently inducted gas-mixture quantity as the basic quantity  
20 is then corrected by at least the ratio of current pressure to basic pressure of the gas mixture and/or the ratio of basic temperature to current temperature of the gas mixture. Furthermore, a fresh-gas portion of the inducted gas mixture for the current engine state is ascertained, whereupon the  
25 current exhaust-gas recirculation quantity is determined on the basis of the difference between the ascertained current gas-mixture quantity and the ascertained fresh-gas portion.

30 2.3. The use for diesel engines of motor vehicles, for instance.